

and 48-53 wide across tip. Antennal segments, length (width); 14-16 (28-31); 31-38 (26); 50-59 (31); 60-62 (28-31); 42-53 (22-25); 39-45 (19-22); 36-42 (14-17); 28-35 (8). Sense cones 28-30 long.

Prothorax 120-140 long, 168-184 wide across anterior margin, 234-260 across posterior margin. Anteroangulars 37-58, anteromarginals minute, midlaterals 36-58, epimerals 53-77, postangulars 50-75, Fore femora broad, 84-123 wide inclusive of tooth; width of fore tibia at apex, inclusive of scale 36-44.

Pterothorax longitudinally reticulate, with a minute pair of setae at middle, 22-25 long. Fore wings 600-750 long with 5-7 double fringes; basal wing bristles 42-56, 44-58 and 67-100 long respectively, the first two little expanded, the remaining one knobbed.

DEPARTMENT OF ZOOLOGY,
D. A. V. (PG) COLLEGE,
DEHRA DUN-248 001,
August 6, 1980.

Abdomen 92-98 wide across middle of IX segment, B₁-B₃ bristles of IX segment 95-117, 20-31, and 126-154 long. Tube 117-140 long. 39-50 wide at middle; anal setae 110-182 long.

Total body length: 1.40-1.70 mm.

Material: 10 females and 5 males from galls of *Mallotus philippinensis* and *Casearia tomentosa* on 18.5.1979 and 25.4.1979 respectively from Raipur, Dehra Dun District, Coll. Vijay Veer.

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28. STUDIES ON KASHMIR HIMALAYAN UMBELLIFERAE III — SOME NEW RECORDS

Umbelliferae (now Apiaceae) is cosmopolitan in distribution with maximum diversity in northern hemisphere particularly in Central Asia and the Mediterranean region. The latter for sufficient reasons is regarded as the primary

centre of umbellifer diversity (Mathias 1965). Located as they are in mid-northern latitudes in physical contiguity with the centre of origin, Kashmir Himalayas too support a respectable number of umbellifers (Hamal & Koul 1981)

which have been listed and/or described from time to time by several explorers. Exploratory trips undertaken to various parts of Jammu and Kashmir state have brought to light four taxa so far not known from this region. These are, *Hydrocotyle sibthoroides* Lam., *Scaligeria stewartianum* (Nasir) Nasir, *Torilis arvensis* (Hudson) Link. and *T. stocksiana* (Boiss) Drude. While *Hydrocotyle sibthoroides* represents a new record for Jammu & Kashmir state, the remaining three are new records for India, and distribution notes of these species form the text of the present communication. Voucher specimens of all the four new records have been deposited in the Herbarium of Biosciences Department of the University of Jammu Under No.'s. IAH, 103, 202, 203, 401, 182, 402, 90, 151, 78, & 74.

Hydrocotyle sibthoroides Lam. Encyl. 3; (1879); Nasir. Fl. W. Pak. 20 (1972).

Plants herbaceous and glabrous; stem creeping; abaxial leaf surface scarcely pubescent; involucre bracts absent; flowers 3-9 per umbel, subsessile, greenish-white in colour; fruit sub-orbicular, compressed laterally, each mericarp has five primary ridges of which dorsal and intermediate are far more prominent than the laterals; furrows wider in centre and narrowing towards poles. Flowering time May-September.

Distribution: The species is widely distributed in tropical Asia, India, China, Japan and Europe. In Kashmir Himalayas, it is abundant on the grassy banks of water bodies, brooks and channels. Place of present collection: Nishat Garden, Srinagar (IAH, 103).

Scaligeria stewartianum (Nasir) Nasir Fl. W. Pak. 20 : 79 (1972).

Plants 15-60 cm tall, glabrous and branched; root stock globose; radical leaves 2-3 pinnate, segments filiform-linear, upper leaves sessile; involucre absent; umbel rays 5-10; involucre of

3-5 minute, white margined bractlets; flowers white; fruit ovoid, subdidymous, each mericarp has five obtuse and hispid primary ridges that run from base to apex, commissural face of mericarps grooved. Flowering time, April-May.

Distribution: The species was first described in 1963 by Nasir under the name *Bunium stewartianum* from plants collected from Kahuta Road near Rawalpindi in Pakistan. So far the species is known only from northern foot hills of that country. In Jammu and Kashmir state, the species is distributed south of Pir Panjal range, 600-1,200 metres above sea level. Places of present collection : Poni Parkh (IAH 202), Kangri (IAH 203) and Ram Nagar (IAH 401).

Torilis arvensis (Hudson) Link; Enu. Hort. Berol. Alt. 1 : 265 (1821) Tutin; Fl. Europ. (1968)

Plants 30-90 cm tall, erect; leaves 1-2 pinnate, segments lanceolate, coarsely toothed; involucre mostly absent, rarely one; rays 4-6; involucre of linear bractlets; flowers white; fruit oval-oblong, compressed laterally, each mericarp bears five primary ridges and an equal number of alternating, strongly developed secondary ridges, the former bear two rows of papillate hairs while the latter carries spines at right angles to fruit surface; mature mericarps 4.0 x 2.0 mm, commissural face 0.25 mm broad. Flowering time, February-April.

Distribution: The species is widely distributed in the Mediterranean region and Europe. There is a solitary report of its occurrence in Pakistan. In Kashmir Himalayas the species abounds in the lower foot hills around Jammu city. Restricted distribution in Kashmir Himalayas indicate that the species represents recent introduction to this area. Places of present collection; Bahu Fort, Jammu (IAH 82), Poni Parkh (IAH 402).

Torilis stocksiana (Boiss) Drude. In Engl. Das Pflzn. (1898).

Plants 25-80 cm tall and hispid; leaves 1-2 pinnate, pinnae dissected,; ultimate segments oblong-lanceolate; peduncles long, leaf opposed; involucre bracts absent; umbels 2-6 rayed, rays unequal, densely pubescent at base; involucre of 5-7 linear bractlets; flowers white; fruit oblong-elliptical, mericarps laterally compressed with a narrow (0.5 mm broad) commissural face, each mericarp bears five primary ridges that are clothed with a row of papillate hairs, secondary ridges present in between the primary ridges bear 2-3 rows of straight, hard and glochidate spines; mericarp 5.0 x 1.5 mm

in size. Flowering time, February-April.

Distribution: The species is so far known only from Iran (Mediterranean region). In Jammu and Kashmir state, it is distributed from subtropical regions of Jammu (IAH, 90) and Udhampur (IAH, 151) to outer hills of Rajouri (IAH, 74) and Poonch (IAH, 78).

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29. PHENOTYPES OF SANDAL (*SANTALUM ALBUM* L.)

INTRODUCTION

Santalum album L. exhibits plenty of variations and earlier workers attempted to categorise them into certain types. As early as 1874, Roxburgh found a variety of sandal growing in Northern Circars which was quite different from the normal sandal and described it as a separate species *Santalum myrtifolium*. De Candolle (1856) believed it to be a variety of *Santalum album* L. Brandis however united them into one species namely *Santalum album* L. and this was followed by Hooker (1890) in his Flora of British India. Lushington (1900) believed them to be two distinct species. Badami and Venkata Rao (1930) studied the

variations found in the *Santalum album* L. and explored the possibilities of distinguishing different types. Griffith (1937) described a peculiar variety of sandal occurring in the Noganur R.F. of the present Hosur Division (Tamil Nadu). It had all the outward characteristics of spiked sandal but otherwise remaining healthy and bearing flowers and fruits.

With this back ground, investigations were carried out in this centre to find out the occurrence of distinct phenotypes in the natural populations. Though, based on various morphological characters, a number of phenotypes could be recognised. So far this centre has been able to distinguish three definite phenotypic populations and they are described below.